
<u>CLAIMS</u>	<u>DETAILED DESCRIPTION</u>	<u>TECHNICAL FIELD</u>	<u>PRIOR ART</u>	<u>EFFECT OF THE</u>
<u>INVENTION</u>	<u>TECHNICAL PROBLEM</u>	<u>MEANS</u>	<u>OPERATION</u>	<u>EXAMPLE</u>
<u>DRAWINGS</u>	<u>DRAWINGS</u>			

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CLAIMS

[Claim(s)]

[Claim 1] A washing method of a hollow fiber module characterized by draining where the inside of a container is pressurized after performing air scrubbing.

[Claim 2] They are 0.05 kgf / cm² - 5 kgf / cm² about the inside of a container after performing air scrubbing. A washing method of a hollow fiber module characterized by draining in the condition of having pressurized.

[Claim 3] After using a hollow fiber module with an undiluted solution feed hopper, air supply opening, an exhaust port, air vent opening, and filtered water output port, closing air vent opening, an exhaust port, and air vent opening and performing filtration operation of an undiluted solution In a washing method of a hollow fiber module that air wash actuation which consists of an air scrubbing production process and a drainage work degree performs filtration engine-performance recovery of a hollow fiber A washing method of a hollow fiber module characterized by draining where it opened an exhaust port for an aperture, it opened closing and air supply opening for air vent opening and the inside of a container is pressurized by supply air, after opening an exhaust port for closing, air supply opening, and air vent opening and performing air scrubbing.

[Claim 4] A washing method of a hollow fiber module according to claim 1 characterized by fixing a hollow fiber bunch and a container of a hollow fiber module to one with adhesives.

[Claim 5] A washing method of a hollow fiber module according to claim 1 characterized by a hollow fiber which constitutes a hollow fiber module consisting of a polymer which uses acrylonitrile as at least 1 component.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the hollow fiber module for performing filtration actuation of a liquid.

[0002]

[Description of the Prior Art] if many SS components, a particle, dust, bacteria, algae, etc. are contained in common industrial water and it is used as it is -- service water -- it is easy to become the cause which produces troubles, such as plugging of piping, bacterial growth, and scale deposition in Rhine. In order to remove these underwater mixing components conventionally, various methods, such as sand filtration, condensation filtration, coagulation sedimentation filtration, and cartridge filtration, have been used according to a use. Filtration by the porous hollow fiber is beginning to put in practical use as the new technique of changing to such general filtration recently. The water treatment by the hollow fiber and filtration spread quickly in recent years, and are becoming large [the Field of application] every year.

[0003] In filtration of a hollow fiber, after a hollow fiber bundles what 1000 - what [10,000] in a bunch, it is processed into the goods gestalt of the configuration which fixed the edge with adhesives. And what was processed into these goods gestalten is called the hollow fiber module. As a hollow fiber module which can filter a liquid, the thing of many gestalten is proposed from the former. There are a filtration module used especially as an early thing combining a moderate pretreatment means, a thing aiming at reverse osmosis filtration, a thing aiming at a dialysis use, etc., many module gestalten are proposed by making these uses into a key objective, and when the main thing is mentioned, there are some which are indicated by JP,48-28380,B, JP,49-69550,A, JP,53-100176,A, etc. As for these all, in filtering a liquid, in throwing away or the phase in which dirt adhered more than the constant rate, it was common to have carried out washing and the Flushing processing by clarified water or drug solution water.

[0004] On the other hand, a hollow fiber module configuration is elaborated recently and the method of carrying out engine-performance recovery of a hollow fiber by Ayr is tried. JP,61-263605,A includes a hollow fiber in a U character mold, contains and uses it for a container, makes Ayr introduce from the Ayr inlet periodically established in the lower part of a container, vibrates a hollow fiber by Ayr scrubbing, and tries removal of the sediment of a film surface. Moreover, JP,60-206415,A is the both-ends cover-half module which made the hollow fiber arrange around a central tube, and is said thing which includes in a container similarly and removes the sediment of a hollow fiber film surface by Ayr scrubbing. As for such technology, examination of utilization is already started.

[0005] Moreover, the simplification of module structure and improvement in the Ayr scrubbing effect are aimed at, and the module which prepared the central tube with a scrubbing air feed hopper in the center of a hollow fiber bunch is also used (publication number 5-096136).

[0006]

[Problem(s) to be Solved by the Invention] Since dust, suspended matter, etc. will adhere to a film surface and filtration pressure will rise if filtration actuation is continued, it is necessary to perform physical washing actuation periodically and to remove the adhesion component of a film surface in operation of a hollow fiber module. About the operation stage of physical washing actuation, although the case where physical washing actuation is performed etc. is common if the case where physical washing actuation is performed for every fixed

time amount, and a constant pressure are reached, the following technical problem is left behind by the present washing actuation. That is, although it is desirable to end as much as possible also seen from the field of effectiveness for a short time as for washing actuation in order to suspend and carry out filtration actuation, in air scrubbing washing which is one of the physical washing methods that effectiveness is the highest, the sum total of each production process of air scrubbing, wastewater, and water supply becomes washing time amount in practice, and it requires most time amount.

[0007] since washing time amount suspends filtration actuation and is performed, although it becomes impossible to supply filtered water, continue in the meantime -- supply of a filtered water -- when required, a filtrate tank is formed, the method of supplying with a pump is common, and the one of tank capacity where washing time amount is shorter is small, and ends. Although the method of performing filtration and washing by turns, respectively is also adopted, while filtered water is obtained continuously, using a module or a module unit two sets, equipment becomes large and cost also becomes high.

[0008] Then, optimization of washing time amount, a washing gap, a washing air content, etc. is performed by condition examination of the washing method. However, in filtration operation of raw water with much dirt, since the time amount which washing takes became quite long, the means which can shorten washing time amount was searched for.

[0009]

[Means for Solving the Problem] The purpose of this invention is fundamentally attained by draining, where the inside of a container is pressurized, after performing air scrubbing.

[0010] Although not limited especially, specifically, it is as follows.

[0011] First, after using a hollow fiber module with an undiluted solution feed hopper, air supply opening, an exhaust port, air vent opening, and filtered water output port as a hollow fiber module, closing air vent opening and an exhaust port and performing filtration operation of an undiluted solution In a washing method of a hollow fiber module that air wash actuation which consists of an air scrubbing production process and a drainage work degree performs filtration engine-performance recovery of a hollow fiber After opening an exhaust port for closing, air supply opening, and air vent opening and performing air scrubbing, it is attained by draining, where it opened an exhaust port for an aperture, it opened closing and air supply opening for air vent opening and the inside of a container is pressurized by supply air.

[0012]

[Function] The hollow fiber module in connection with this invention and the conventional example is shown in drawing 1.

[0013] The feedwater filtered is supplied from the undiluted solution feed hopper 3 of a porosity hollow filament filtration membrane module (it is called a hollow fiber module below), is filtered by the countless micropore currently opened on the surface of the hollow fiber, and only the clarified water with which SS component, a particle, a contaminant, bacteria, etc. were removed penetrates it inside a hollow fiber, and it is taken out from the filtered water outlet 7 as filtered water. Although the amount of filtered water becomes large so that a raw water pressure is large in filtration of a hollow fiber module, said SS component, a particle, etc. adhere to a film surface with the filtration passage of time, the blinding of a hollow fiber arises to some extent, and, usually the amount of filtered water per same pressure falls gradually. Therefore, when [suitable] the blinding of a hollow fiber advances to eye a use ***** many and the amount of filtered water falls a hollow fiber and a module to it at a long period of time, washing actuation including air scrubbing is performed, and it is necessary even for level near before blinding to recover the amount of filtered water of a hollow fiber.

[0014] Although the conventional example and the method of washing actuation of this invention are explained below using a drawing, thereby, especially this invention is not limited.

[0015] First, the procedure of the conventional example is explained. In order that the hollow fiber 8 with which drawing 1 is general module structure and the container 1 was filled up may wash the dirt of a film surface by filtration, closing, the air supply opening 4 for washing, and the air vent opening 5 are opened for the undiluted solution feed hopper 3, air scrubbing is performed, and ***** and ***** are performed in the affix of a film surface. After air scrubbing termination, where closing and air vent opening are wide opened in air supply opening for washing, the unclean penetrant remover opens an exhaust port 6, and is discharged outside. If an undiluted solution feed hopper is opened after discharge and a container is filled with an undiluted solution, an undiluted solution supply pressure will be applied to closing and a container in air vent opening, and filtered

water will be supplied from filtered water output port 7. Usually, the case where the dirt of a film surface is larger needs to take long air scrubbing time amount, and washing frequency also becomes high. Washing time amount 5 minutes -, and no less than 10 minutes were required for the large undiluted solution of dirt, such as river water and a lake, to the filtration time amount 30 - 60 minutes.

[0016] On the other hand, in this invention, actuation was improved as follows. namely, the actuation which drains by opening an exhaust port 6 while supplying the air for washing of the above-mentioned conventional example from the air supply opening 4 -- it is and changes into the condition of having closed the air vent opening 5, in this application. Since the penetrant remover in which it became dirty in the container 1 is pushed on the air for washing and discharged in the state of pressurization by this, compared with the case where there is no air pressurization for washing, it becomes early, and compared with the usual wastewater actuation which does not supply air, washing time amount becomes short remarkably.

[0017] A table 1 compares with the conventional operating procedure the washing operating procedure which used the method of the above this invention.

[0018]

[A table 1]

発明操作手順	本発明操作手順						従来操作手順			
	ろ過操作			洗浄操作			ろ過操作		洗浄操作	
	スタート (通水)	ろ過	空気スクラビング	排水	通水		スタート (通水)	ろ過	空気スクラビング	排水
	ろ過	ろ過	ろ過	ろ過	ろ過		ろ過	ろ過	ろ過	ろ過
ろ過	開	開	閉	閉	開		開	開	閉	開
ろ過	開	閉	閉	閉	開		開	閉	閉	開
ろ過	閉	閉	閉	閉	開		閉	閉	閉	開
ろ過	閉	閉	閉	閉	開		閉	閉	閉	開
ろ過	閉	閉	閉	閉	開		閉	閉	閉	開
ろ過	閉	閉	閉	閉	開		閉	閉	閉	開

図 1		原液供給	空気供給	洗浄用空	排水口	ろ過水取
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In addition, although an undiluted solution feed hopper, air supply opening, an exhaust port, air vent opening, and filtered water output port illustrated as a drawing the example of the hollow fiber module directly linked with the container independently, respectively like drawing 1 that by which the method of this invention is limited to this structure -- it is not -- for example, undiluted solution feed hopper, air supply opening, and exhaust-port ** -- on the way -- even if it is the module of a gestalt which was collected into coming out one, became one pipe, and has been connected to a container, it is not a failure at all performing the method of this invention.

[0019] It is required to be the degree which does not damage a hollow fiber, and the container internal pressure at the time of air pressurization (differential pressure with atmospheric pressure) is usually 0.05 kgf / cm² - 5 kgf / cm². When it is desirable and economical efficiency and container pressure-proofing are considered, they are 0.1 kgf / cm² - 2.0 kgf / cm². Especially a degree is desirable.

[0020] Also when a module number is one, the effect in the case of draining the penetrant remover in which it became dirty in the container filled up also with a large-sized module or many modules with last thing is large.

[0021] Thus, the method of becoming possible [shortening washing time amount sharply] by washing actuation of this application method was found out.

[0022] By the hollow fiber module, module structure will not be limited, especially if it is the gestalt in which physical washing by air scrubbing is possible. However, the hollow fiber bunch and the container are being preferably fixed to one with adhesives, and the thing of the structure where air is supplied to homogeneity towards the hoop direction exterior from a central tube is desirable.

[0023] The air content for washing is 2 the outer diameter of 100mm, a length of 1100mm, and 12m of film surface products, although it changes with dirt condition of modular magnitude or a film surface. By the module, by 10N l./, about a -50N l./minute is desirable still more desirable, and the amount of -40N l./is good by 20N l./ (N liter means the volume at the time of reference condition [1atm, 0 degree C] here.)

Although washing time amount changes with the water quality and dirt degree of an undiluted solution, and filtration time amount, it is usually good at about 1 - 20 minutes, and if filtration time amount is shortened, it can also shorten washing time amount. However, since the recovery of an undiluted solution will fall if filtration time amount is shortened and the count of washing is made [many], it is not desirable. Generally, it filters with the raw water of about 0.1 - one turbidity for 12 to 24 hours, carries out about 5 - 20 minutes of washing time amount, filters in the raw water of about one - ten turbidity for 0.5 to 1 hour, and is about washing time amount 1-5 minute.

[0024] Although the air scrubbing time amount at the time of washing changes with filtration time amount, its about 1 - 20 minutes are usually common.

[0025] Although there is especially no assignment, and macromolecule resin, such as polyvinyl chloride resin, polycarbonate resin, ABS plastics, and polysulfone resin, is generally preferably used in consideration of an adhesive property with adhesives, metallicity, especially stainless steel are sufficient as the quality of the material of a module container.

[0026] Moreover, as adhesives used in order to paste up the hollow fiber used for this invention, urethane system adhesives, epoxy system adhesives, silicon system adhesives, etc. can be used broadly.

[0027]

[Example]

After being filled up with the hollow fiber bunch which divided 10000 hollow fibers of a polyacrylonitrile with an outer diameter [example 1 / of 450 micrometers], and a bore of 350 micrometers into four bundles into a transparence outer case with an outer diameter [of 104mm], and a bore of 100mm and carrying out another **** seal of the both ends to 2 times with adhesives, the 2nd seal portion was cut for one of the two of an outer case with the slicing machine, and the hollow fiber bunch was made to puncture. After opening the undiluted solution feed hopper, supplying Lake Biwa water by part for 10l./and air's escaping from it using this hollow fiber module, closing, and 10l. the filtered water for /were obtained for air vent opening. Since it let water flow for 1 hour and the film surface became dirty, after opening closing, air vent opening, and air supply opening for the undiluted solution feed hopper and blowing and carrying out scrubbing of the 30l. air for /for 3

minutes, it was 5 seconds when the penetrant remover which opened and became dirty in closing and an exhaust port about air vent opening was drained performing air supply succeeding. Since it let the lake flow from the undiluted solution feed hopper again and the container was filled after washing, air vent opening has been normally filtered, when it let water flow, closing and.

[0028] After filtering Lake Biwa water similarly for 1 hour and carrying out interspace mind scrubbing of the hollow fiber module used for example of comparison 1 example 1 similarly for 3 minutes, when closing air vent opening drained air supply opening in the state of the open beam, wastewater ended it in 1 minute. Air vent opening after wastewater termination was opened, and since it let the lake flow from the undiluted solution feed hopper again and the container was filled, air vent opening has been normally filtered, when it let water flow, closing and.

[0029]

[Effect of the Invention] The liquid containing a particle or a suspended solid is filtered by this invention, and the washing method of the hollow fiber module which can shorten the washing time amount by air scrubbing performed periodically is offered. Moreover, since whenever [water rate-of-flow / at the time of wastewater] is large, it excels also in removal effectiveness, such as precipitate.

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TECHNICAL FIELD

[Industrial Application] This invention relates to the hollow fiber module for performing filtration actuation of a liquid.

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PRIOR ART

[Description of the Prior Art] if many SS components, a particle, dust, bacteria, algae, etc. are contained in common industrial water and it is used as it is -- service water -- it is easy to become the cause which produces troubles, such as plugging of piping, bacterial growth, and scale deposition in Rhine. In order to remove these underwater mixing components conventionally, various methods, such as sand filtration, condensation filtration, coagulation sedimentation filtration, and cartridge filtration, have been used according to a use. Filtration by the porous hollow fiber is beginning to put in practical use as the new technique of changing to such general filtration recently. The water treatment by the hollow fiber and filtration spread quickly in recent years, and are becoming large [the Field of application] every year.

[0003] In filtration of a hollow fiber, after a hollow fiber bundles what 1000 - what [10,000] in a bunch, it is processed into the goods gestalt of the configuration which fixed the edge with adhesives. And what was processed into these goods gestalten is called the hollow fiber module. As a hollow fiber module which can filter a liquid, the thing of many gestalten is proposed from the former. There are a filtration module used especially as an early thing combining a moderate pretreatment means, a thing aiming at reverse osmosis filtration, a thing aiming at a dialysis use, etc., many module gestalten are proposed by making these uses into a key objective, and when the main thing is mentioned, there are some which are indicated by JP,48-28380,B, JP,49-69550,A, JP,53-100176,A, etc. As for these all, in filtering a liquid, in throwing away or the phase in which dirt adhered more than the constant rate, it was common to have carried out washing and the Flushing processing by clarified water or drug solution water.

[0004] On the other hand, a hollow fiber module configuration is elaborated recently and the method of carrying out engine-performance recovery of a hollow fiber by Ayr is tried. JP,61-263605,A includes a hollow fiber in a U character mold, contains and uses it for a container, makes Ayr introduce from the Ayr inlet periodically established in the lower part of a container, vibrates a hollow fiber by Ayr scrubbing, and tries removal of the sediment of a film surface. Moreover, JP,60-206415,A is the both-ends cover-half module which made the hollow fiber arrange around a central tube, and is said thing which includes in a container similarly and removes the sediment of a hollow fiber film surface by Ayr scrubbing. As for such technology, examination of utilization is already started.

[0005] Moreover, the simplification of module structure and improvement in the Ayr scrubbing effect are aimed at, and the module which prepared the central tube with a scrubbing air feed hopper in the center of a hollow fiber bunch is also used (publication number 5-096136).

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EFFECT OF THE INVENTION

[Effect of the Invention] The liquid containing a particle or a suspended solid is filtered by this invention, and the washing method of the hollow fiber module which can shorten the washing time amount by air scrubbing performed periodically is offered. Moreover, since whenever [water rate-of-flow / at the time of wastewater] is large, it excels also in removal effectiveness, such as precipitate.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Since dust, suspended matter, etc. will adhere to a film surface and filtration pressure will rise if filtration actuation is continued, it is necessary to perform physical washing actuation periodically and to remove the adhesion component of a film surface in operation of a hollow fiber module. About the operation stage of physical washing actuation, although the case where physical washing actuation is performed etc. is common if the case where physical washing actuation is performed for every fixed time amount, and a constant pressure are reached, the following technical problem is left behind by the present washing actuation. That is, although it is desirable to end as much as possible also seen from the field of effectiveness for a short time as for washing actuation in order to suspend and carry out filtration actuation, in air scrubbing washing which is one of the physical washing methods that effectiveness is the highest, the sum total of each production process of air scrubbing, wastewater, and water supply becomes washing time amount in practice, and it requires most time amount.

[0007] since washing time amount suspends filtration actuation and is performed, although it becomes impossible to supply filtered water, continue in the meantime -- supply of a filtered water -- when required, a filtrate tank is formed, the method of supplying with a pump is common, and the one of tank capacity where washing time amount is shorter is small, and ends. Although the method of performing filtration and washing by turns, respectively is also adopted, while filtered water is obtained continuously, using a module or a module unit two sets, equipment becomes large and cost also becomes high.

[0008] Then, optimization of washing time amount, a washing gap, a washing air content, etc. is performed by condition examination of the washing method. However, in filtration operation of raw water with much dirt, since the time amount which washing takes became quite long, the means which can shorten washing time amount was searched for.

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MEANS

[Means for Solving the Problem] The purpose of this invention is fundamentally attained by draining, where the inside of a container is pressurized, after performing air scrubbing.

[0010] Although not limited especially, specifically, it is as follows.

[0011] First, after using a hollow fiber module with an undiluted solution feed hopper, air supply opening, an exhaust port, air vent opening, and filtered water output port as a hollow fiber module, closing air vent opening and an exhaust port and performing filtration operation of an undiluted solution In a washing method of a hollow fiber module that air wash actuation which consists of an air scrubbing production process and a drainage work degree performs filtration engine-performance recovery of a hollow fiber After opening an exhaust port for closing, air supply opening, and air vent opening and performing air scrubbing, it is attained by draining, where it opened an exhaust port for an aperture, it opened closing and air supply opening for air vent opening and the inside of a container is pressurized by supply air.

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OPERATION

[Function] The hollow fiber module in connection with this invention and the conventional example is shown in drawing 1.

[0013] The feedwater filtered is supplied from the undiluted solution feed hopper 3 of a porosity hollow filament filtration membrane module (it is called a hollow fiber module below), is filtered by the countless micropore currently opened on the surface of the hollow fiber, and only the clarified water with which SS component, a particle, a contaminant, bacteria, etc. were removed penetrates it inside a hollow fiber, and it is taken out from the filtered water outlet 7 as filtered water. Although the amount of filtered water becomes large so that a raw water pressure is large in filtration of a hollow fiber module, said SS component, a particle, etc. adhere to a film surface with the filtration passage of time, the blinding of a hollow fiber arises to some extent, and, usually the amount of filtered water per same pressure falls gradually. Therefore, when [suitable] the blinding of a hollow fiber advances to eye a use ***** many and the amount of filtered water falls a hollow fiber and a module to it at a long period of time, washing actuation including air scrubbing is performed, and it is necessary even for level near before blinding to recover the amount of filtered water of a hollow fiber.

[0014] Although the conventional example and the method of washing actuation of this invention are explained below using a drawing, thereby, especially this invention is not limited.

[0015] First, the procedure of the conventional example is explained. In order that the hollow fiber 8 with which drawing 1 is general module structure and the container 1 was filled up may wash the dirt of a film surface by filtration, closing, the air supply opening 4 for washing, and the air vent opening 5 are opened for the undiluted solution feed hopper 3, air scrubbing is performed, and ***** and ***** are performed in the affix of a film surface. After air scrubbing termination, where closing and air vent opening are wide opened in air supply opening for washing, the unclean penetrant remover opens an exhaust port 6, and is discharged outside. If an undiluted solution feed hopper is opened after discharge and a container is filled with an undiluted solution, an undiluted solution supply pressure will be applied to closing and a container in air vent opening, and filtered water will be supplied from filtered water output port 7. Usually, the case where the dirt of a film surface is larger needs to take long air scrubbing time amount, and washing frequency also becomes high. Washing time amount 5 minutes -, and no less than 10 minutes were required for the large undiluted solution of dirt, such as river water and a lake, to the filtration time amount 30 - 60 minutes.

[0016] On the other hand, in this invention, actuation was improved as follows. namely, the actuation which drains by opening an exhaust port 6 while supplying the air for washing of the above-mentioned conventional example from the air supply opening 4 -- it is and changes into the condition of having closed the air vent opening 5, in this application. Since the penetrant remover in which it became dirty in the container 1 is pushed on the air for washing and discharged in the state of pressurization by this, compared with the case where there is no air pressurization for washing, it becomes early, and compared with the usual wastewater actuation which does not supply air, washing time amount becomes short remarkably.

[0017] A table 1 compares with the conventional operating procedure the washing operating procedure which used the method of the above this invention.

[0018]

表 1 本発明操作手順

	本発明操作手順					従来操作手順				
	ろ過操作		洗浄操作			ろ過操作		洗浄操作		
	スタート (通水)	ろ過	空気スク ラビング	排水	通水	スタート (通水)	ろ過	空気スク ラビング	排水	通水
原液供給口	開	開	閉	閉	開	開	開	閉	閉	開
空気抜き口	開	閉	閉	閉	開	開	閉	閉	閉	開
洗浄用空気供給口	閉	閉	開	閉	閉	閉	閉	開	閉	閉
排水口	閉	閉	閉	開	閉	閉	閉	閉	閉	閉
ろ過水取り出し口	開	開	閉	閉	開	開	開	閉	閉	開

In addition, although an undiluted solution feed hopper, air supply opening, an exhaust port, air vent opening, and filtered water output port illustrated as a drawing the example of the hollow fiber module directly linked with the container independently, respectively like drawing 1 that by which the method of this invention is limited to this structure -- it is not -- for example, undiluted solution feed hopper, air supply opening, and exhaust-port ** -- on the way -- even if it is the module of a gestalt which was collected into coming out one, became one pipe, and has been connected to a container, it is not a failure at all performing the method of this invention. [0019] It is required to be the degree which does not damage a hollow fiber, and the container internal pressure at the time of air pressurization (differential pressure with atmospheric pressure) is usually 0.05 kgf /

cm² - 5 kgf / cm². When it is desirable and economical efficiency and container pressure-proofing are considered, they are 0.1 kgf / cm² - 2.0 kgf / cm². Especially a degree is desirable.

[0020] Also when a module number is one, the effect in the case of draining the penetrant remover in which it became dirty in the container filled up also with a large-sized module or many modules with last thing is large.

[0021] Thus, the method of becoming possible [shortening washing time amount sharply] by washing actuation of this application method was found out.

[0022] By the hollow fiber module, module structure will not be limited, especially if it is the gestalt in which physical washing by air scrubbing is possible. However, the hollow fiber bunch and the container are being preferably fixed to one with adhesives, and the thing of the structure where air is supplied to homogeneity towards the hoop direction exterior from a central tube is desirable.

[0023] The air content for washing is 2 the outer diameter of 100mm, a length of 1100mm, and 12m of film surface products, although it changes with dirt condition of modular magnitude or a film surface. By the module, by 10N l./, about a -50N l./minute is desirable still more desirable, and the amount of -40N l./is good by 20N l./ (N liter means the volume at the time of reference condition [1atm, 0 degree C] here.)

Although washing time amount changes with the water quality and dirt degree of an undiluted solution, and filtration time amount, it is usually good at about 1 - 20 minutes, and if filtration time amount is shortened, it can also shorten washing time amount. However, since the recovery of an undiluted solution will fall if filtration time amount is shortened and the count of washing is made [many], it is not desirable. Generally, it filters with the raw water of about 0.1 - one turbidity for 12 to 24 hours, carries out about 5 - 20 minutes of washing time amount, filters in the raw water of about one - ten turbidity for 0.5 to 1 hour, and is about washing time amount 1-5 minute.

[0024] Although the air scrubbing time amount at the time of washing changes with filtration time amount, its about 1 - 20 minutes are usually common.

[0025] Although there is especially no assignment, and macromolecule resin, such as polyvinyl chloride resin, polycarbonate resin, ABS plastics, and polysulfone resin, is generally preferably used in consideration of an adhesive property with adhesives, metallicity, especially stainless steel are sufficient as the quality of the material of a module container.

[0026] Moreover, as adhesives used in order to paste up the hollow fiber used for this invention, urethane system adhesives, epoxy system adhesives, silicon system adhesives, etc. can be used broadly.

[Translation done.]

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EXAMPLE

[Example]

After being filled up with the hollow fiber bunch which divided 10000 hollow fibers of a polyacrylonitrile with an outer diameter [example 1 / of 450 micrometers], and a bore of 350 micrometers into four bundles into a transperance outer case with an outer diameter [of 104mm], and a bore of 100mm and carrying out another **** seal of the both ends to 2 times with adhesives, the 2nd seal portion was cut for one of the two of an outer case with the slicing machine, and the hollow fiber bunch was made to puncture. After opening the undiluted solution feed hopper, supplying Lake Biwa water by part for 10l./and air's escaping from it using this hollow fiber module, closing, and 10l. the filtered water for /were obtained for air vent opening. Since it let water flow for 1 hour and the film surface became dirty, after opening closing, air vent opening, and air supply opening for the undiluted solution feed hopper and blowing and carrying out scrubbing of the 30l. air for /for 3 minutes, it was 5 seconds when the penetrant remover which opened and became dirty in closing and an exhaust port about air vent opening was drained performing air supply succeedingly. Since it let the lake flow from the undiluted solution feed hopper again and the container was filled after washing, air vent opening has been normally filtered, when it let water flow, closing and.

[0028] After filtering Lake Biwa water similarly for 1 hour and carrying out interspace mind scrubbing of the hollow fiber module used for example of comparison 1 example 1 similarly for 3 minutes, when closing air vent opening drained air supply opening in the state of the open beam, wastewater ended it in 1 minute. Air vent opening after wastewater termination was opened, and since it let the lake flow from the undiluted solution feed hopper again and the container was filled, air vent opening has been normally filtered, when it let water flow, closing and.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is an example of the hollow fiber module used by this invention.

[Description of Notations]

- 1: Container
- 2: Cap
- 3: Undiluted solution feed hopper
- 4: Air supply opening
- 5: Air vent opening
- 6: Exhaust port
- 7: Filtered water output port
- 8: Hollow fiber
- 9: Air-outlet hole
- 10: Plug

[Translation done.]

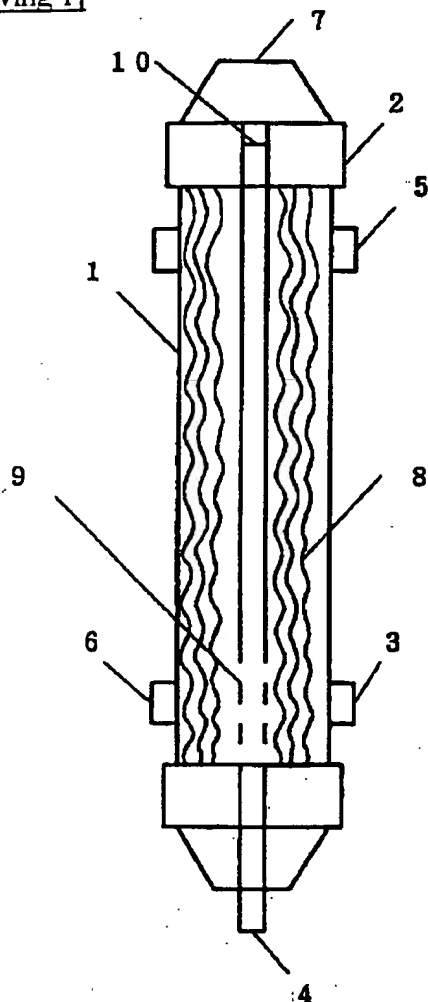
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DRAWINGS

[Drawing 1]



[Translation done.]